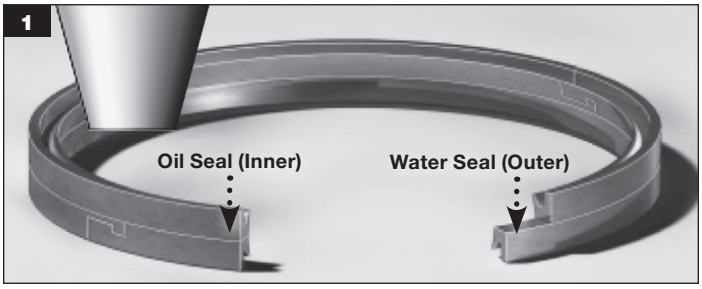
Kaplan Turbine
Runner Blade Trunnion Split Seal

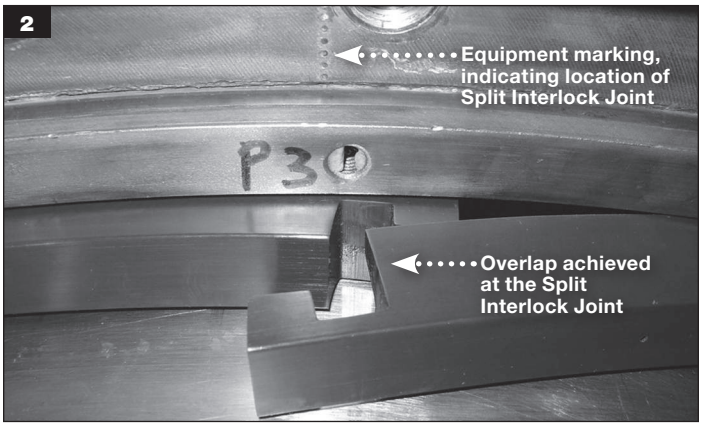
GENERAL COMMENTS



Runner Blade Trunnion Split Seal

- This procedure applies to both the inner (oil) and outer (water) seal installation.
- Typically sufficient light oil is present on the surfaces of the equipment that the installation process does not benefit from adding further lubrication. If however, the system is completely dry and free of any lubrication it may prove beneficial to lightly coat the seal and / or the equipment with mineral oil. The use of mineral oil is not detrimental to the properties of the seal material (AWC800). The decision to add lubrication can be made on site during the installation and is a personal preference of the installation team.
- AWC recommends the use of only non-ferrous installation tools to reduce the risk of damage to the equipment surfaces.
- It has been shown that the installation process is made easier if the seal has been pre-warmed. It is not critical to the installation process and cold seals can be installed, however, compressing the sealing lip and cross section is made easier if the seal material is at 21°C / 70°F vs. a typical turbine pit temperature of 10°C / 50°F.
- It is recommended that the active installation is performed by two people only, thereby proper attention and communication can be given to ensuring a preload at the split interlock joint.
- When supplied, the inner diameter of the sealing lip of each turbine seal is smaller than the blade trunnion diameter. After installation, this lip is in compression around the turbine blade trunnion. Because of this, if insufficient compression of the lip is applied during installation, the spring force in the lip will cause the turbine seal to remain open and appear to be insufficient length. Correct installation achieves sufficient compression by obtaining an overlap at the split interlock joint as described below.

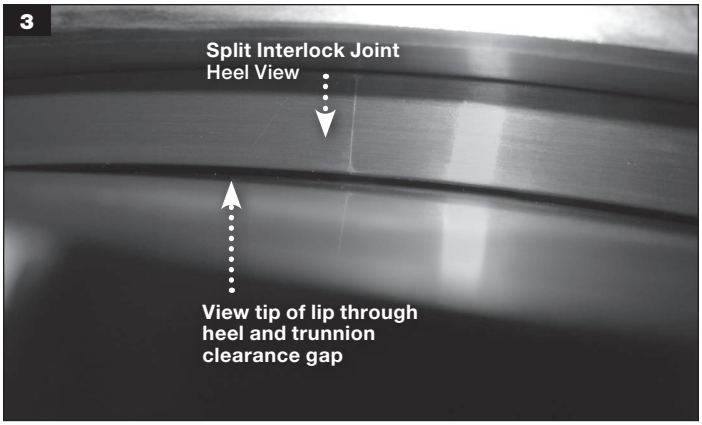
OIL SEAL INSTALLATION



Overlap of Oil Seal (Inner) Split Interlock Joint

- The oil seal is to be installed with the sealing lips facing towards the oil i.e. into the hub. The split interlock joint should be located between the 10 and 2 o'clock position, typically 12 o'clock is preferred.
- Place the seal around the blade trunnion with the split interlock joint located at the 12 o'clock position. Start inserting the seal into the equipment, starting at the 6 o'clock position (diametrically opposite the split interlock joint).
- Continue inserting the seal gradually moving around the circumference from the 6 o'clock position to 12 o'clock – simultaneously on both sides of the blade hub. The objective is to ensure the split interlock joint has radial compression when installed into the gland.

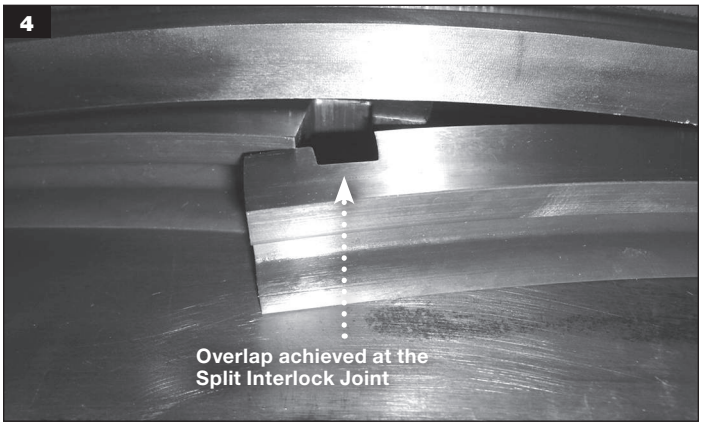
- To ensure sufficient radial compression it is recommended that an overlap is achieved at the split interlock joint prior to finally inserting the split interlock section into the cavity (see figure 2) and as such working towards the joint area eliminates the risk of pulling the interlock apart.
- Repeat the maneuver while increasing the depth of the seal; start at 6 o'clock and redo the same path on both sides of the blade hub. It is important to recognize that at all times while working the seal into the stuffing box any potential 'stretching' of the seal should be directed towards the split interlock to maintain the radial compression of the joint.
- Complete a visual inspection of the split interlock joint, by observing first the heel area, then the tip of the lip through the clearance gap between the blade trunnion and the ID of the heel (see figure 3). The joint *must* be tight, with no visible gap.



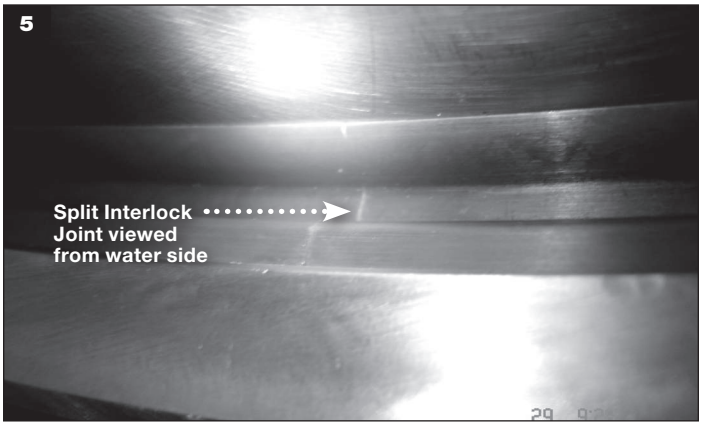
Installed View of the Oil Seal (Inner) Split Interlock Joint

WATER SEAL INSTALLATION

- The water seal is to be installed with the sealing lips facing out i.e. towards the water. The split interlock joint should be located diametrically opposite the oil seal interlock joint, typically 6 o'clock position.
- Do not locate the split interlock joint in a position that coincides with space between the gland cover plates (approx 4mm between plates).
- Place the seal around the blade trunnion with the split interlock joint located at the 6 o'clock position. Start inserting the seal into the equipment, starting at the 12 o'clock position (diametrically opposite the split interlock). Continue installation of the seal using the procedure described for the oil seal, ensuring radial compression is achieved at the split interlock prior to insertion into the equipment (see figure 4).
- Following full insertion of the seal, inspection of the sealing lip at the interlock joint area is easier than the inner seal, as the lip is easily viewed and the lips are facing towards the installer (see figure 5). The joint *must* be tight, with no visible gap.



Overlap of Water Seal (Outer) Split Interlock Joint



Installed View of the Water Seal (Outer) Split Interlock Joint

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